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ABSTRACT

This study sought to determine if the Ways of Knowing Inventory (WOKI) was useful as a measure of intellectual/epistemological development among interns, cooperating teachers, and university supervisors who were engaged in a one-year student teaching experience. The WOKI is a 49-item questionnaire based on the epistemological positions described in "Women's Ways of Knowing" (Belenky et al., 1986). The 74 female participants completed the WOKI at the outset of the 1995-96 school year. The results indicated moderate-to-strong positive correlations between silence and received knowledge, and between subjective knowledge and procedural knowledge; moderate positive correlations between silence and subjective knowledge, silence and procedural knowledge, and received knowledge and subjective knowledge, received knowledge and procedural knowledge, and subjective knowledge and constructed knowledge. The implications of these findings for the mentoring relationship are discussed. An appendix provides WOKI sample items. (Contains 10 references.) (MDM)

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The Use of the Ways of Knowing Inventory with Graduate Student Teaching Interns and their Cooperating Teachers and University Supervisors

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Introduction

The purpose of this study was to determine if the Ways of Knowing Inventory (WOKI) was useful as a measure of intellectual/epistemological development among interns, cooperating teachers, and university supervisors who were engaged in a one-year student teaching experience. Cooperating teachers and university supervisors mentored interns during the post-BA fifth-year of an integrated 5-year program of teacher preparation. The WOKI is based on the epistemological positions described in Women's Ways of Knowing (Belenky, Clinchy, Goldberger, & Tarule (1986). We were interested in the WOKI as a means to understand characteristics of intern-cooperating teacher-supervisor match or mismatch and the effects on the growth of the intern during the preservice teaching experience. Using this information, we hoped to better describe the origins of problems arising in the mentoring relationship. The 74 participants completed the WOKI at the outset of the 1995-1996 school year. A Pearson's correlation and a regression analysis were done between the subscales on the WOKI. The results showed that the constructed knowledge subscale scores were highest for this sample and that five significant intercorrelations existed between subscales on the WOKI. The latter result was different from the results Buczynski (1993,1995) found in her original WOKI research. Given our results, we advise caution in using the WOKI with post-BA and older populations. The study and implications of these findings for the mentoring relationship are discussed.

Theoretical Background

In 1986, *Women's Ways of Knowing* (Belenky, Clinchy, Goldberger, & Tarule) was published. This book was the result of research conducted by the authors with 135 women. The women were from diverse academic and socio-economic backgrounds and they represented women from teenage years through early 20s. Each interview began with the question "Looking back, what stands out for you over the past few years?" (p.11). The results of the research led the authors to identify five "epistemological perspectives from which women know and view the world" (p. 15). The perspectives are silence, received knowledge, subjective knowledge, procedural knowledge, and constructed knowledge. Belenky et al. left it to later theorists and practitioners to decide if the perspectives could be viewed as stages (p. 15).

Silence is the position that Belenky et al. (1986) characterized as one where a woman takes direction from an "authority" and does not have a "voice." The authors found only two or three women at this position at the time of the interviews, but many women described experiences in the past that would have positioned them at Silence. At the second position is a Received Knower who relies on external experts to tell her what to do. A woman at this position is beginning to discover her voice. She receives knowledge, uses it, and passes it on to others.

The third position is Subjective Knowledge. A woman at this position begins to listen to her "inner voice" rather than an authority. She begins to rely on her own judgment but she is still not sure if there is a "right answer." She becomes her own authority. A Procedural Knower is one who reasons, and looks at issues from many perspectives. Belenky et al. defined procedural knowledge as having two parts: separate

and connected knowing. Separate procedural knowers tend to be analytical in their evaluation and follow particular techniques or rules to investigate a problem or issue. Connected procedural knowers are concerned with understanding others, feeling what others feel, in their investigation of a problem. Finally, Constructed Knowing is the position where a woman considers the situation, who and what is involved, she listens and shares with others, and then she comes to an answer (pp. 144-146).

Ways of Knowing Inventory (WOKI)

The WOKI is a 49-item questionnaire using a four-point Likert type scale, ranging from 'strongly disagree' to 'strongly agree' (Buczynski, 1993, p. 198). As mentioned previously, the WOKI is based on the work of Belenky et al. (1986) on epistemological perspectives of women. Buczynski developed the WOKI to contribute an easy to administer instrument that looks at developmental characteristics generally found in women (Buczynski, 1993, p.1). The method of Belenky et al. (1986) was an interview protocol taking one to two hours or more. A paper-and-pencil measure, if proven to be valid and reliable, would greatly simplify the investigations of developmental stage and growth. Buczynski was encouraged by the results of her 1993 and 1995 investigations of the 49-item WOKI which takes 20 minutes to administer and is objectively and easily scored.

A respondent selects an answer from a four-point Likert Scale as follows:

Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree

Scoring the items is done according to the following points:

- Strongly Disagree - 1 point

- Somewhat Disagree - 2 points
- Somewhat Agree - 3 points
- Strongly Agree - 4 points

Items on the WOKI are grouped by epistemological position as discussed in *Women's Ways of Knowing* (Belenky, Clinchy, Goldberger, & Tarule (1986)). The following table shows the epistemological positions, item numbers related to the position, the total number of items for each epistemological position, and maximum possible score.

Table 1: Ways of Knowing Inventory Scoring

Epistemological Position	Item Numbers	Total Number of Items	Maximum Possible Score
Silence	1, 2, 3, 4, 12, 19, 20, 30	8	32
Received Knowledge	10, 13, 33, 36, 40, 41, 42	7	28
Subjective Knowledge	14, 15, 16, 17, 31, 44, 45, 46, 48, 49	10	40
Procedural Knowledge	5, 6, 8, 9, 11, 18, 21, 22, 24, 27, 28, 29, 32, 37, 39	15	60
Constructed Knowledge	7, 23, 25, 26, 34, 35, 43	7	28
Total Items		47	

Item numbers 38 and 47 are omitted from the scoring based on the original research Buczynski conducted with the WOKI in 1993. Those two items were found to be independent from the epistemological positions and were therefore omitted from further scoring.

In 1993, Buczynski conducted the initial study using the WOKI. There were 348 white women students, 95% of whom were undergraduates, participating in the initial study. The age of the students was 18-25, and the mean age was 22.78. Of the sample, the predominant group were first year undergraduates at 41.7% of the sample; sophomores were 9.6%, juniors were 21.2%, and seniors were 22.4%. All students completed the WOKI in small-group situations. The factor analysis showed that the five factors of silence, received knowledge, subjective knowledge, procedural knowledge, and constructed knowledge were present. Buczynski also did alpha internal reliability coefficients, and these were in acceptable limits. The conclusions point to support for the

five factors. Further, the author recommended that more analysis be carried out and future samples be larger and more ethnically diverse.

Buczynski (1995) re-analyzed her earlier data by performing a "confirmatory factor analysis" on the WOKI. Using the scores from the original study, Buczynski hypothesized a model of the five subscales on the WOKI (silence, received knowledge, subjective knowledge, procedural knowledge, and constructed knowledge) and "confirmed the model via a LISREL analysis" (p. 7).

Current Research

Our current research was conducted with a group of 74 women who were student teaching interns, cooperating teachers, or university supervisors associated with a five-year integrated Master of Education program at a large public university in the Northeast. The purpose of the research was to determine if the WOKI was useful as a measure of intellectual development among student teachers, cooperating teachers, and university supervisors.

The WOKI was chosen because Buczynski (1993) had seen some promising results with college students and:

- It is a measure based on women's intellectual development
- It is an easy to administer, paper-and-pencil measure
- Eighty percent of the student interns in this particular program are women
- About the same percentage of cooperating teachers are women

Sample

The sample of 74 women were drawn from a larger population of student teachers, cooperating teachers, and university supervisors. The 36 student teaching interns all

possessed bachelor's degrees and were involved in the 12-credit year-long internship as part of their master's degree program. The interns range in age from 21 to 42. About 75% of the interns are between the ages of 21 and 27.

There were 28 female cooperating teachers who completed the WOKI. Complete demographic data was available for 23 of these cooperating teachers. The average number of years of teaching experience for the 23 cooperating teachers was 15.5 years, with a range from 6 to 26 years of teaching experience. Seven of the teachers were in their first year as a cooperating teacher for internship. Sixteen teachers had a range of 1 to 8 years of prior experience as a cooperating teacher, with the average number of years of prior cooperating teacher experience equal to 4.5 years. Ten (10) out of the 23 cooperating teachers have taken the four-credit university supervision course that is offered for all interested cooperating teachers. Twenty-two (22) of the 23 cooperating teachers were in schools where a cluster of from 3 to 6 student teaching interns were placed for the full-year internship. Sixteen (16) of the cooperating teachers were teaching at elementary school cluster sites and 6 were teaching at secondary school cluster sites.

There were 10 female university supervisors who completed the WOKI; 6 supervised elementary interns and 4 supervised secondary interns. They ranged in age from 28 to 58. All had taught at the elementary or secondary level, and their range of teaching experience was from 1 to 22 years, with an average of 7.9 years of teaching experience. One of the ten supervisors was very experienced in supervising interns; she had been supervising for 23 years, and she taught the university course in supervision. Four of the supervisors were in their first year of supervising experience. The remaining five supervisors had between 1 and 6 years of prior supervising experience with student teaching interns. Three of the supervisors were in a masters degree program; a fourth was completing a doctoral program. The fifth supervisor had her M.Ed. and was a Teacher-In-Residence for a year at the university. One additional supervisor was hired on a part-time basis. All six of these supervisors had been involved in the university supervision course.

The remaining four supervisors were full-time university faculty members, with supervision counting as two-fifths of their teaching course load per year.

Method

The sample of 74 women completed the WOKI at the start of the 1995-1996 school year. The instruments were scored and compared to the results which Buczynski found in her studies. A Pearson's correlation was done between the subscales on the WOKI.

Data Analysis

Table 2 shows the descriptive data for the WOKI subscales for the entire sample.

Table 2: Descriptive Data for WOKI Subscale Scores

Variable	N	Mean	Standard Deviation	Range of Scores	Maximum Possible Score
Silence	74	15.58	3.47	9-28	32
Received Knowledge	74	17.52	4.08	10-31	40
Subjective Knowledge	74	15.58	3.61	7-24	28
Procedural Knowledge	74	32.21	4.34	23-42	60
Constructed Knowledge	74	24.83	2.32	21-28	28

Table 3 shows the descriptive data for the WOKI subscales for the entire sample by role.

Table 3: Descriptive Data for WOKI Subscale Scores by Role

Variable	N	Mean	Standard Deviation	Range of Scores	Maximum Possible Score
Student Interns					
Silence	36	16.03	3.73	9-28	32
Received Knowledge	36	18.25	3.96	12-31	40
Subjective Knowledge	36	16.50	3.75	8-24	28
Procedural Knowledge	36	32.88	4.92	23-42	60
Constructed Knowledge	36	24.70	2.50	21-28	28
Cooperating Teachers					
Silence	28	15.46	3.36	10-26	32
Received Knowledge	28	17.42	3.89	11-26	40
Subjective Knowledge	28	14.93	3.53	7-22	28
Procedural Knowledge	28	31.50	3.52	25-38	60
Constructed Knowledge	28	24.46	2.24	21-28	28
Supervisors					
Silence	10	14.30	2.67	10-19	32
Received Knowledge	10	15.20	4.52	10-24	40
Subjective Knowledge	10	14.10	2.60	9-18	28
Procedural Knowledge	10	31.80	4.24	24-38	60
Constructed Knowledge	10	26.40	1.07	25-28	28

WOKI data and discussion.

The WOKI was given to all participants to determine their intellectual development level. Each individual receives a score on each of five WOKI subscales as noted in Table

3. Notice that this population had a mean score of 24.97 out of a possible 28 on the constructed knowledge subscale. This indicates that this group's responses fit the constructed knowledge epistemological position. Belenky, Clinchy, Goldberger, & Tarule (1986) wrote that the women in their interviews who were constructed knowers described knowing as "an effort to reclaim the self by attempting to *integrate* knowledge they had learned from others. They [constructed knowers] told of weaving together the strands of rational and emotive thought and of integrating objective and subjective knowing" (p. 134). This position can be further characterized by one who works together with others, who listens and shares, and who collaborates to arrive at knowledge.

Intercorrelations Among WOKI Subscales

The intercorrelations among the WOKI subscales for the current research are shown in Table 4.

Table 4: Intercorrelations Among WOKI Subscales - Current Research with Interns, Cooperating Teachers, and Supervisors (N=74)

	Received Knowledge	Subjective Knowledge	Procedural Knowledge	Constructed Knowledge
Silence	.47**	.15	.25*	-.14
Received-Knowledge		.29*	.28*	-.15
Subjective-Knowledge			.45**	.18
Procedural-Knowledge				.07
Constructed-Knowledge				

*p < .05 **p < .01

For the purposes of this research, a low correlation is .10 or less, a moderate correlation is greater than .10 and less than or equal to .30, a moderate to strong correlation is greater than .30 and less than or equal to .59. A strong correlation is one which is greater than .60 (Wolf, 1986).

There are five significant correlations. There are moderate to strong positive correlations between silence and received knowledge and subjective knowledge and procedural knowledge; moderate positive correlations between silence and subjective knowledge, silence and procedural knowledge, received knowledge and subjective knowledge, received knowledge and procedural knowledge, and subjective knowledge and constructed knowledge.

As evidenced in the intercorrelations in Table 4 the constructed knowledge subscale is independent of the other four subscales of the Ways of Knowing Inventory. This finding adds to our knowledge by reinforcing the qualitative stage shift from the earlier positions to the position of constructed knowledge. Might this be similar to the

shift in moral or ego development stage theory from conventional to post-conventional thought? We therefore suggest that the WOKI when used with post-BA and older populations similar to our sample is helpful for identifying those interns, cooperating teacher or supervisors with constructed knowledge epistemologies.

These findings are very different from what Buczynski (1993) found on her initial sample of 348 college students. The results of the intercorrelations she calculated are shown in Table 5.

Table 5: WOKI Intercorrelations - Buczynski (1993) Results

Subscales	Received Knowledge	Subjective Knowledge	Procedural Knowledge	Constructed Knowledge
Silence	.16	.28	.23	-.16
Received Knowledge	—	.09	.11	-.06
Subjective Knowledge	—	—	.09	-.03
Procedural Knowledge	—	—	—	-.24
Constructed Knowledge	—	—	—	—

Note that she did not report p-values for the intercorrelations, but she stated that the "five factors proved to be independent as illustrated by the low factor Intercorrelations" (p. 197). Buczynski also calculated Cronbach's alpha internal reliability coefficients for each subscale. They were ".69 for Silence, .69 for Subjective, .72 for Received, .74 for constructed, and .80 for procedural" (p. 199).

A possible explanation for the differences between the intercorrelations of the WOKI subscales on the current research and Buczynski's (1993) research is that her sample was primarily undergraduate students. The sample for the current research comprised student teaching interns who were graduate students, and their university supervisors and cooperating teachers who have many years of teaching experience.

Belenky et al. did not say that the epistemological positions were independent stages but many have interpreted their 1986 work to suggest five independent positions, and that seemed true in Buczynski's studies.

In our research, by using the results of the WOKI and the interview data from seven pairs of cooperating teachers and interns, it seems clear that these cooperating teacher and student teaching intern pairs responded from one position or another depending on the situation in which they found themselves.

Importance of the Study

We were interested in the WOKI as a means to understand characteristics of intern-cooperating teacher-supervisor relationships and the effects on the growth of the intern during the full-year teaching experience. It was our hope that the WOKI would give us a measurement of the epistemological position of the interns, supervisors, and cooperating teachers. Using this information we hoped to better describe the origins of problems arising between intern and cooperating teacher. For example, if an intern's score was high on received knowledge, and a cooperating teacher's score was high on constructed knowledge, this might give us some clues about how each of them respond in certain situations. We felt that this information would give us a base from which to work on approaches to problem-solving in the intern-cooperating teacher working relationship.

Could the WOKI be useful as an instrument that examines women's ways of knowing and the match between preservice teachers and their cooperating teachers (since a large percentage of teachers (>70%) are women)? The WOKI is a paper-and -pencil measure that is easy to administer but does it provide dependable information for post-BA women? When we embarked on this study, we did so because the instrument looked

promising after the results Buczynski obtained with undergraduate students. Given our results, we advise caution in using the WOKI with a post-BA and older population. Buczynski's participants were 348 undergraduate students who ranged in age from 18-25, and the 74 participants for our study were post-BA women who ranged in age from 22-58. It is not clear what the elements are that caused the differing results, but it points to a need for more WOKI studies with older populations before it is more universally adopted as a measure of epistemological positions.

In another paper (Struck, 1998) we suggest using the WOKI in conjunction with a more reliable written measure of intellectual development. We suggest using the WOKI in conjunction with David Hunt's Conceptual Level Method (Hunt, 1975;1976;Hunt&Sullivan, 1974; Hunt et al. 1978). Using interview data from seven of our pairs of interns and cooperating teachers we describe intern and cooperating relationships that are successful and less successful, collaborative or less collaborative. We find that problems in the mentoring relationship between intern and cooperating teacher can be understood better by considering results of both the WOKI-Likert measure and the Paragraph Completion Method-sentence stems (see Appendix A).

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Appendix A

Ways of Knowing Inventory- Sample Items

Dimension	Item
Silence	When I am in class and I don't understand what the teacher is talking about, I usually just sit there and don't let on that I am confused.
	When we have a discussion in class on a certain topic I usually do not participate in the discussion.
Received Knowledge	A good student is someone who can absorb and store knowledge received from others.
	I find myself looking to others for knowledge.
	I think that learning is retaining and returning what authorities tell me.
Subjective Knowledge	In the past, I have felt that I have never had my own independent identity but instead I have always been busy being someone's daughter/son, wife/husband, girlfriend/boyfriend, or significant other.
	Sometimes I feel like I am on a speeding freight train and I have no control over the events in my life
	In the past, I have never felt like I had my own identity or sense of self.
Procedural Knowledge	I like playing the devil's advocate. (That is, arguing the opposite of what someone is saying.)
	I find that instead of seeing issues in black and white, I see them in shades of gray.
Constructed Knowledge	When I disagree with someone, I often find myself trying to enter that other person's frame of reference to try and understand why that person thinks a certain way.
	When I have an idea about something, and it differs from the way another person is thinking about it, I will usually try to look at it from that person's point of view, see how they could think that, why they think they're right.
	It is important for me to understand why people think a certain way.
	I pay close attention to the context in which a situation develops before making a value judgment.

Paragraph Completion Method - Sentence Stems

1. What I think about rules...
2. When I am criticized...
3. When someone does not agree with me...
4. When I am not sure...
5. When I am told what to do...